PRAIRIE WIND TRAJECTORY AND CEREAL RUST RISK REPORT for June 11-17, 2024

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Agriculture and Agri-Food Canada (AAFC) and Environment and Climate Change Canada (ECCC) have been working together to study the potential of trajectories for monitoring insect movements since the late 1990s. Trajectory models are used to deliver an early-warning system for the origin and destination of migratory invasive species, including plant pathogens. Plant pathologists have shown that trajectories can assist with the prediction of plant disease infestations. We receive two types of model output from ECCC: reverse trajectories and forward trajectories.

'Reverse trajectories' refer to air currents that are tracked back in time from specified Canadian locations over a five-day period prior to their arrival date. If plant pathogens are present in the air currents that originate from these southern locations, they may be deposited on the Prairies at sites along the trajectory, depending on the local weather conditions at the time that the trajectories pass over our area (e.g. rain showers, etc.). Reverse trajectories are the best available estimate of the ''true'' 3D wind fields at a specific point. They are based on observations, satellite and radiosonde data.

Disclaimer

Information related to trajectory events based on forecast and diagnostic wind fields and cereal rust risk is experimental, and is **OFFERED TO THE PUBLIC FOR INFORMATIONAL PURPOSES ONLY**. Agriculture and Agri-Food Canada, Environment Canada, and their employees assume no liability from the use of this information.

1. RUST DEVELOPMENT IN SOURCE LOCATIONS

a. Pacific Northwest (PNW)

i. Earlier PCDMN cereal rust risk updates outlined previous stripe rust risk forecasts and symptom observations in the PNW by Dr. X Chen from USDA ARS/Washington State University (https://prairiecropdisease.com/cereal-rust-risk/; https://prairiecropdisease.com/).

ii. Previous reports from the PNW suggested an increased risk of stripe rust and observations of increased levels of symptoms, especially in breeding trials and nurseries. However, surveys by Dr. Chen at the end of May indicated limited development in commercial winter wheat and spring wheat and barley fields (Dr. Chen, stripe rust update, May 31, 2024, https://www.wawg.org/stripe-rust-update-05-31-high-rust-pressure-present/). Dr. Chen indicated the lack of observations in commercial fields was likely related to the use of resistant varieties as well as fungicide application. However, significant symptoms of stripe rust were observed by Dr. Chen on goat grass in various locations including in and around commercial winter wheat fields, park areas and roadsides. Interestingly, Dr. Chen reported stripe rust in a winter barley research field in the Pullman region, although it was at lower levels as compared to winter wheat trials. In a previous report Dr. Chen noted the observation of a hot spot of elevated severity in a commercial field. In his May 31st report Dr. Chen indicated that there have been recent reports of stripe rust re-developing in commercial winter wheat fields that had been previously sprayed. Potential cool weather conditions may promote further development and Dr. Chen is encouraging farmers to think about a second fungicide application using products labeled for post head emergence and where the preharvest interval is suitable. Dr. Chen also cautions about stripe rust risk in spring wheat and barley and the potential need for fungicide application with susceptible varieties.

iii. **As of June 19, 2024, although no further updates are available, the relatively limited development of stripe rust in commercial fields suggests the PNW may not be a significant source of rust spores currently. However, potential further development in commercial PNW winter wheat fields could**

increase this risk. The PCDMN will adjust their risk assessment for the PNW as new updates on the PNW stripe rust situation are available.

iv. A Montana State University (MSU) June 14, 2024 Ag Alert has reported stripe rust in MSU winter wheat research trials in Sidney and Creston, MT, while other stripe rust reports have come from Chouteau County, MT. The MSU Schutter Diagnostic Lab, MSU, and Dr. U. McKelvy, MSU are also concerned that forecast cooler moister conditions, especially in SW Montana may facilitate further stripe rust development and impact (https://t.co/qfbJO8Qdos; https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf). **Wheat producers in southern Alberta and southwest Saskatchewan should be vigilant regarding the appearance of stripe rust, especially in susceptible varieties.**

v. Currently there are no reports of stripe rust symptoms in Prairie commercial winter or spring wheat crops although symptoms have been reported at AAFC Lethbridge by Dr. R. Aboukhaddour, AAFC Lethbridge (https://x.com/ReemWheat/status/1791567749489312080). Previously, early development of stripe rust in disease nurseries at Abbotsford and Creston, BC was reported by Dr. G. Brar, U of Alberta, formerly of UBC, and likely reflect overwintering on winter wheat breeding lines (https://x.com/gurcharn_brar/status/1779910374051209644).

b. **Texas/Oklahoma**

i. Earlier PCDMN cereal rust risk updates outlined previous observations and concerns regarding stripe rust in Texas and Oklahoma as well as reports of leaf and stem rust in wheat and crown rust in oat (https://prairiecropdisease.com/cereal-rust-risk/; https://prairiecropdisease.com/).

ii. Texas and Oklahoma crops are mostly mature and have been or will soon be harvested. In Texas as of June 16, 2024, 63% of the winter wheat crop has been harvested, while in Oklahoma 83% of the winter wheat crop has been harvested (https://quickstats.nass.usda.gov/results/218B6322-CB54-3AE4-899B-2B4BABAE1193; https://quickstats.nass.usda.gov/results/9FBE6ADA-AB95-38E8-8B75-FF059977266E). Given that Texas and Oklahoma winter wheat crops are mainly mature and harvesting is well underway, they no longer represent a significant source of rust inoculum for the Prairie region.

iii. **As of June 19, 2024, there is a no to limited risk associated with the Texas/Oklahoma region being a significant source of stripe rust inoculum for dispersal into the Prairie region of Canada.** Updates for Texas/Oklahoma will be ended for 2024.

c. **Kansas/Nebraska**

i. Earlier PCDMN cereal rust risk updates outlined previous observations and concerns regarding rusts in Kansas and Nebraska winter wheat crops (https://prairiecropdisease.com/cereal-rust-risk/; https://prairiecropdisease.com/).

ii. In his latest update Dr. DeWolf indicated that stripe rust has been found in most Kansas counties, with areas in central and western Kansas having increased levels (Dr. E. DeWolf, Update on Wheat Rusts in Kansas, Cereal Rust Survey CEREAL-RUST-SURVEY@LISTS.UMN.EDU, June 12, 2024; https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf). Figure 1 shows the most recent distribution of stripe rust in Kansas counties (https://wheat.agpestmonitor.org/stripe-rust/ (as of June 19, 2024). Dr. DeWolf also indicated that leaf rust was found in a number of Kansas regions, but is not expected to cause significant damage, while some stem rust has also been noted, especially in relation to its earlier appearance in 2024. Finally, he also reported that oat crown rust was found in Riley County, Kansas.

iii. USDA crop progress reports indicate that as of June 16, 2024, 76% of the Kansas winter wheat crop is mature, with 8% of the crop being harvested (https://quickstats.nass.usda.gov/results/7697AE4A-A089-347D-BD9E-C773202FAA83; https://quickstats.nass.usda.gov/results/B84A3FA8-068A-3F77-ACDE-24B9ABCE69F5). As Kansas winter wheat crop mature and are harvested, stripe rust would no longer be active and thus Kansas will no longer represent a significant source of rust inoculum.

iv. The most recent update from Dr. S. Wegulo, UNL, indicates that stripe rust is present in all wheat producing areas of Nebraska, with up to severe levels being observed in irrigated fields or where rainfall occurred (Dr. S. Wegulo, Update from Nebraska, CEREAL-RUST-SURVEY@LISTS.UMN.EDU, June 13, 2024; https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024; https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf). Dr. Wegulo also mentions that leaf rust at low levels was found 14 days previously and mainly in southern regions, but is not expected to affect productivity. Figures 2 and 3 provide updates on the distribution of stripe and leaf rust in Nebraska, respectively and as of June 13, 2024.

v. **As of June 19, 2024, there is a low-moderate risk associated with the Kansas/Nebraska region being a significant source of stripe and leaf rust inoculum for dispersal into the Prairie region of Canada. Note the risk from Nebraska crops would be moderate.** As winter wheat matures in Kansas and harvest continues, this region will no longer represent a significant source of stripe rust inoculum for the Prairie region in 2024. Nebraska crops are beyond the window for fungicide application, but will continue to be a potential stripe rust source until the crop starts to mature and is harvested (https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024).

vi. Of interest are the continuing numerous reports of stripe rust in southern Ontario winter wheat fields, where inoculum has likely arrived from neighbouring states south and west of Ontario, e.g. Louisiana through to Michigan and northwest New York State (Figure 1).

d. **The Dakotas, Wisconsin, and Minnesota**

i. On May 27, 2024, Dr. M. Shires reported the detection of stripe rust in multiple areas in Brookings County, South Dakota, while the SDSU Winter Wheat Breeding program reported stripe rust in a variety trial in the same county (https://x.com/maddishires/status/1795078948113563786; https://x.com/WheatInnovation/status/1794915400012206296).

ii. S. Thapa, SDSU Graduate Research Assistant, reported increased levels of stripe rust on SDSU winter wheat breeding plots, while Dr. M. Shires, SDSU Assistant Professor reported stripe rust at low levels in the Pierre region of SD and widespread low levels in the south central areas of SD on May 31, 2024 (https://twitter.com/SubashSDSU/status/1797005319253709055; https://twitter.com/maddishires/status/1796665662539964802; https://twitter.com/maddishires/status/1796585340767252918).

iii. Most recently T. Pawar, Research Associate, SDSU reported severe levels of stripe rust in plots at the SDSU Volga research farm (https://x.com/PawarTapish/status/1798442920711971315).

iv. During the week of May 20-24, 2024, Dr. D.L. Smith, University of Wisconsin-Madison, reported stripe rust in two Wisconsin counties (Figure 1 [note it appears that not all jurisdictions in the USA are using the Wheat AgPestMonitor reporting system] https://badgercropdoc.com/2024/05/24/wisconsin-winter-wheat-disease-update-may-24-2024/). There have been more recent reports of stripe rust in Wisconsin (S. Conley, Small Grain Specialist, University of Wisconsin, https://x.com/badgerbean/status/1799215404809679160). While on June 12, 2024, Dr. D. Smith reported increased stripe rust development on susceptible wheat varieties in the Arlington region of Wisconsin (https://twitter.com/badgercropdoc/status/1801012395822772261).

v. In early June 2024, stripe rust was confirmed in Cass County Minnesota (https://x.com/arthuragronomy/status/1799501650765250916), while there have been several other reports from Dr. A. Friskop, Extension Plant Pathologist, NDSU, of stripe rust in winter wheat and spring wheat and these observations are thought to be fairly early for this disease (https://x.com/NDSUcerealpath/status/1798814635480748533; https://www.ndsu.edu/agriculture/sites/default/files/2024-06/6%20CPR%20June%2013%202024_F.pdf). Dr. Friskop indicates that predicted lower temperatures and rainfall may favour further development in North Dakota.

e. The third USDA Cereal Rust Bulletin coordinated by Dr. Oluseyi Fajolu, USDA Cereal Disease Laboratory, St. Paul, MN, provides a general overview of observations of various rust issues and complements what is reported above for Kansas, Nebraska, South Dakota, North Dakota, Minnesota and Wisconsin (https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf).

1. **Given the close proximity of stripe rust affected wheat in North Dakota, Prairie wheat growers, especially in eastern Saskatchewan and Manitoba, should be extra vigilant regarding the appearance of stripe rust.**

2. **<u>Reverse trajectories (RT)</u>**
   a. Since April 1, 2024 73% of reverse trajectories that have crossed the Prairies have originated from the Pacific Northwest (Idaho, Oregon and Washington). The number of reverse trajectories that originated over Texas, Oklahoma, Kansas and Nebraska continues to be approximately half of the total number for the same time period in 2023. This past week (June 11-17, 2024) many reverse trajectories were observed to originate over Oregon and Washington before crossing the Prairies.
   b. Potential introduction of plant pathogens to the Canadian Prairies from the USA is a complex process that involves a number of factors. Risk of pathogen introduction can be associated with: a) occurrence of reverse trajectories that originate over areas known to be associated with elevated levels of plant pathogens, b) trajectories that occur at low altitudes, and c) prairie locations are associated with precipitation events when reverse trajectories are passing over. Between June 11 and June 16 these three conditions were met for fields near Winnipeg and Selkirk, Manitoba. Over a five day interval, reverse trajectories originated from a number of regions that may result in pathogen introduction to Prairie crops. The ECCC wind dispersal model predicted that on June 15, 2024 three trajectories passed over the Winnipeg area. These trajectories originated from Oregon, Idaho, Texas, Oklahoma, Kansas and Nebraska (Figure 4). This type of result is rare. In most cases, reverse trajectories originate from one or two of these states prior to crossing the Prairies. Pathogen risk, may increase when trajectories are close to ground level. Reverse trajectories that originated over Texas, Oklahoma, Kansas and Nebraska (blue line) were 500 to 1500 m above ground level and these then passed over the Great Plains and into Manitoba (June 11-15). Lastly, rain totals near Winnipeg were 25 mm (June 15 and 16) and may have resulted in the potential downward movement of pathogens. **These results suggest that potential risk of introduction of pathogens could be high over this past weekend.**
   c. **Pacific Northwest (Washington, Oregon, Idaho)** – Since April 1, 751 reverse trajectories have passed over the Prairies from the Pacific Northwest; since May 29 there has been a significant increase in the number of reverse trajectories that have originated from the Pacific Northwest (Figure 5). These 96 trajectories from June 11-17, 2024 have passed over southern Alberta, Saskatchewan and southwestern Manitoba (Figures 6 and 7; Table 1). Prairie locations with elevated numbers of trajectories from June 11-17, 2024 included LETHBRIDGE and VULCAN, AB with five trajectories, BEISEKER and CALGARY, AB, GAINSBOROUGH and MOOSE JAW, SK and BRANDON and CARMAN, MB with four trajectories, LACOMBE, MEDICINE HAT, OLDS, and PROVOST, AB, SWIFT CURRENT, TISDALE, UNITY, WEYBURN and YORKTON, SK and DAUPHIN, PORTAGE, RUSSELL and SELKIRK, MB with three trajectories (Table 1).
      i. **For the week of June 11 to 17, 2024, there was a moderate risk associated with the PNW region being a significant source of wind trajectories for dispersal of the stripe rust pathogen into the Prairie region of Canada. Note, locations with 3-5 trajectories would have a higher risk.**
   d. **Oklahoma and Texas** – This past week, reverse trajectories, originating over Oklahoma and Texas were reported to cross four locations in southeastern Saskatchewan and Manitoba on June 15 and 16 with only one trajectory per location (Table 3; Figures 8 and 9).
      i. **For the week of June 11-17, 2024, there was low risk associated with the TX/OK region being a significant source of wind trajectories for dispersal of stripe rust into the Prairie region of Canada. Given the status of winter wheat development in TX/OK, this region no longer represents an important source of rust inoculum for the Prairie region and subsequent risk reports will no longer include TX/OK.**
   e. **Nebraska and Kansas –** Reverse trajectories, originating from Kansas and Nebraska, have primarily passed over Manitoba and southeastern Saskatchewan (April 1 – June 17, 2024) (Figures 10 and 11). Wind dispersal models predicted that most of this past week's reverse trajectories crossed over Manitoba and southeastern Saskatchewan on June 11, 15 and 16, with one-two trajectories per location (Table 2).

i. **For the week of June 11-17, 2024, there is low risk associated with the KS/NE region being a significant source of wind trajectories for dispersal of the stripe rust pathogen into the Prairie region of Canada.**

3. Prairie Crop Development, Weather Conditions, and Overwintering of Rust

a. **Winter wheat** – Winter wheat continues growth in mid-June with fall-seeded crops progressing from the flag-leaf stage, booting, head emergence, and to the flowering and filling growth stages, depending on the crop (winter wheat versus fall rye), province and region (https://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report/pubs/crop-report-2024-06-18.pdf).

b. **Spring wheat** – Across the prairie region spring wheat is continuing to develop from the seedling stage, tillering, to flag leaf emergence depending on the province and region (https://open.alberta.ca/dataset/a8632ff6-a50d-496c-8dc6-7cee941b5977/resource/af8ca0d7-59cb-4eef-b98e-dcca50cdb4e4/download/agi-itrb-alberta-crop-report-2024-06-11-abbreviated-report.pdf; https://publications.saskatchewan.ca/api/v1/products/123595/formats/144289/download; https://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report/pubs/crop-report-2024-06-18.pdf).

c. **Weather synopsis** – Growing season temperatures have been marginally warmer than average while rainfall amounts continue to be above average. This past week (June 10-16, 2024) temperatures were very similar to climate normal values. The average temperature across the Prairies was 14.4 °C (Figure 12). Warmest temperatures were observed across most of Manitoba. Average cumulative seven day rainfall was 29.4 mm. Lowest rainfall values were observed across most of Alberta as well as southern regions of Manitoba and Saskatchewan (Figure 13). Relative to climate normals, average temperatures have been cooler than normal over the past few weeks.

d. The average 30 day temperature (May 18 – June 16, 2024) was 12 °C and was 1°C cooler than the long term average temperature. The warmest temperatures were continuing to be south of an area extending from Winnipeg to Saskatoon and southwest to Lethbridge (Figure 14). Most of the Prairies have reported 30 day rainfall amounts were normal to above normal. Average cumulative rainfall (mm) over the past 30 days was 78 mm and is 164% of climate normal values. Rainfall amounts were lowest across Alberta (Figure 15). Provincial 30 day values were 60 mm, 77 mm and 120 mm for Alberta, Saskatchewan and Manitoba.

e. Since April 1, the 2024 growing season has been 0.5 °C warmer than average. Warmest average temperatures were observed across a region extending from Winnipeg to Saskatoon and southwest to Lethbridge (Figure 16). Growing season rainfall has been above normal across most of the Prairies (Figure 17). Only a few, limited, regions have had normal or below normal growing season rainfall (Figure 6 – yellow, orange). Rain amounts have been 191% of climate normals. Cumulative rainfall has been greatest for most of Manitoba and the Parkland region of Saskatchewan (Figure 18).

f. Currently, there are no reports of early season stripe rust development in winter wheat, which would suggest potential overwintering, especially of stripe rust (personal communication: S. Rehman, R. Aboukhaddour, AAFC Lethbridge; and H.R. Kutcher, U. of S.).

4. Overall, Rust Risk Assessment and Need For In-Crop Scouting

a. **Pacific Northwest** – There were moderate numbers of reverse wind trajectories that passed over the PNW region and into the Prairies, while the most recent reports available indicate that stripe rust development is limited in commercial fields although there are concerns that it could restart in previously sprayed commercial crops. Prairie winter wheat crops are generally progressing from flag leaf emergence through to flowering, while much of the spring wheat crop is at the seedling to tillering stage, with some reports of crops at the flag leaf stage in Manitoba. Rainfall amounts were lowest in southern Alberta, across an area from the Edmonton region to NW Saskatchewan and southwestern Saskatchewan and some areas of east-central southern Saskatchewan. However, areas in central to northcentral and eastern Saskatchewan, western Manitoba and the interlaces and Winnipeg region received more rainfall. **Overall, as of June 19,**

2024, the risk of stripe rust appearance from the PNW is relatively low and scouting for this disease in the Prairie region as a result of PNW rust inoculum is generally not urgent (Figure 19).

b. **Texas-Oklahoma corridor** – There were only four reverse wind trajectories that passed over the TX/OK region and into the Prairies from June 11-17, 2024, while stripe and leaf rust have been previously reported. However, Texas and Kansas winter wheat crops are either mature or will be shortly with harvesting 63 and 83%% complete, respectively. As a consequence, winter wheat crops in these regions no longer represent a significant source of rust inoculum for the Prairie region. Prairie winter wheat crops are largely at flag leaf to heading/flowering, while much of the spring wheat crop is in the seedling to tillering stages, although there are reports of Manitoba crops already at flag leaf emergence. **Overall, as of June 12, 2024, the risk of stem, leaf, stripe, and crown rust appearance from the Texas-Oklahoma corridor is limited and scouting for these diseases in the Prairie region based on inoculum from TX/OK is not urgent (Figure 20).**

c. **Kansas-Nebraska corridor** – There were only 14 reverse wind trajectories that passed over the KS/NE region and into the Prairies from June 11-17, 2024, while in May and earlier in June stripe and leaf rust (Kansas) development were reported in commercial winter wheat fields in this region. However, Kansas winter wheat crops are progressing and as of June 16, 2024, 76% of the crop mature, with 8% being harvested in Kansas. As a consequence, the Kansas winter wheat will no longer represent a significant source of rust inoculum, especially over the next 1-2 weeks. The most recent reports from Nebraska (June 14, 2024) indicate that stripe rust is present in all wheat producing areas, with up to severe levels being observed in irrigated fields or where rainfall occurred. Prairie winter wheat crops are generally progressing from flag leaf emergence through to flowering, while much of the spring wheat crop is at the seedling to tillering stage, with some reports of crops at the flag leaf stage in Manitoba. Rainfall amounts were lowest in southern Alberta, across an area from the Edmonton region to NW Saskatchewan and southwestern Saskatchewan and some areas of east-central southern Saskatchewan. However, areas in central to northcentral and eastern Saskatchewan, western Manitoba and the interlaces and Winnipeg region received more rainfall. Rainfall in regions with higher amounts could facilitate deposition of rust spores into cereal crops and subsequent disease development. **Overall, as of June 19, 2024, the risk of stem, leaf, stripe, and crown rust appearance from Kansas-Nebraska corridor inoculum is low-moderate and scouting for these diseases in the Prairies is generally not urgent (Figure 21).**

d. **The early and widespread appearance of stripe rust in the PNW and KS/NE regions is still concerning, while the recent stripe rust observations from North Dakota, South Dakota, Minnesota and Wisconsin bring the stripe rust issue very close to the Prairies, especially the central to eastern regions.** Over the next 1-3 weeks if favourable weather conditions (especially more rainfall) occur in the PNW and Nebraska north to the Canadian border, further rust development could occur. This would result in more rust spores being available to be blown into the Prairie region, as well as more northerly rust development into the Dakotas and Minnesota/Wisconsin.

e. Potential introduction of plant pathogens to the Canadian Prairies from the USA is a complex process that involves a number of factors. Risk of pathogen introduction can be associated with: a) occurrence of reverse trajectories that originate over areas known to be associated with elevated levels of plant pathogens, b) trajectories that occur at low altitudes and c) prairie locations are associated with precipitation events when reverse trajectories are passing over. Between June 11 and June 16 these three conditions were met for fields near Winnipeg and Selkirk, Manitoba. Over a five day interval, reverse trajectories originated from a number of USA source regions that may result in pathogen introduction to prairie crops. The ECCC wind dispersal model predicted that on June 15, 2024 three trajectories passed over the Winnipeg area. These trajectories originated from Oregon, Idaho, Texas, Oklahoma, Kansas and Nebraska (Figure 4). This type of result is rare. In most cases, reverse trajectories originate from one or two of these states prior to crossing the Prairies. Pathogen risk, may increase when trajectories are close to ground level. Reverse trajectories that originated over Texas, Oklahoma, Kansas and Nebraska (blue line) were 500 to 1500 m above ground level and these then passed over the Great Plains and into Manitoba (June 11-15). Lastly, rain totals near Winnipeg were 25 mm (June 15 and 16) and may have resulted in the potential downward movement of pathogens. **These results suggest that potential risk of introduction of stripe rust could be high over this past weekend (June 15 and 16, 2024) for the Selkirk/Winnipeg region of Manitoba.**

f. Prairie winter wheat fields are most at risk as they are at the flag leaf to flowering stages, but fortunately most current winter wheat varieties have intermediate to high levels of resistance, although AC Radiant, CDC Buteo, AAC Elevate, Broadview, and CDC Falcon are rated as susceptible (https://www.seed.ab.ca/variety-data/cereals/; https://saskseed.ca/wp-content/uploads/2020/12/2024-Varieties-of-Grain-Crops.pdf; https://www.seedmb.ca/pdf-editions-and-separate-section-pdfs/). In terms of spring wheat (various classes) and durum the following varieties are either an S or MS: 5700PR, AAC Cameron, AAC Iceberg, AAC Tisdale, AAC Tomkins, AAC Warman, AAC Whitefox, AC Foremost , Cardale, CDC Abound, CDC Adamant, CDC Flare, CDC Pilar, Faller, Prosper, SY Natron, SY Rorke, SY Torach, and Unity. **If you are growing a stripe rust susceptible variety, it will be important to keep an eye on your crops for stripe rust especially and follow further PCDMN cereal risk updates (https://prairiecropdisease.com/cereal-rust-risk/).**

g. Where farmers or consultants noticed stripe rust development on winter wheat in the fall of 2023, it is recommended to scout winter wheat fields that have resumed growth in spring 2024. Scouting is especially critical where the variety being grown is susceptible/moderately susceptible to stripe rust. Currently, there have been no early to mid spring reports of stripe rust on winter wheat.

5. Contacts for rust research and extension expertise

a. **Research**
   i. Reem Aboukhaddour, A. Laroche, AAFC Lethbridge, AB, reem.aboukhaddour@agr.gc.ca, andre.laroche@agr.gc.ca. Stripe rust;
   ii. H.R. Kutcher, University of Saskatchewan, Saskatoon, SK, randy.kutcher@usask.ca. Stripe rust;
   iii. B. McCallum, AAFC Morden, MB, brent.mccallum@agr.gc.ca. Leaf rust and stripe rust;
   iv. J. Menzies, AAFC Brandon/Morden, MB, jim.menzies@agr.gc.ca. Stem rust of wheat and oat, crown rust of oat.
   v. S. Rehman, Western Crop Innovations (formerly Olds College), Field Crop Development Centre, Lacombe, AB, srehman@oldscollege.ca. Stripe and leaf rust;
   vi. G. Brar, University of Alberta, gurcharn.brar@ualberta.ca. Stripe rust.

b. **Extension**
   i. Alberta Ministry of Agriculture and Irrigation, Mike Harding, michael.harding@gov.ab.ca;
   ii. Saskatchewan Ministry of Agriculture, Alireza Akhavan, alireza.akhavan@gov.sk.ca;
   iii. Manitoba Ministry of Agriculture, David Kaminski, david.kaminski@gov.mb.ca.

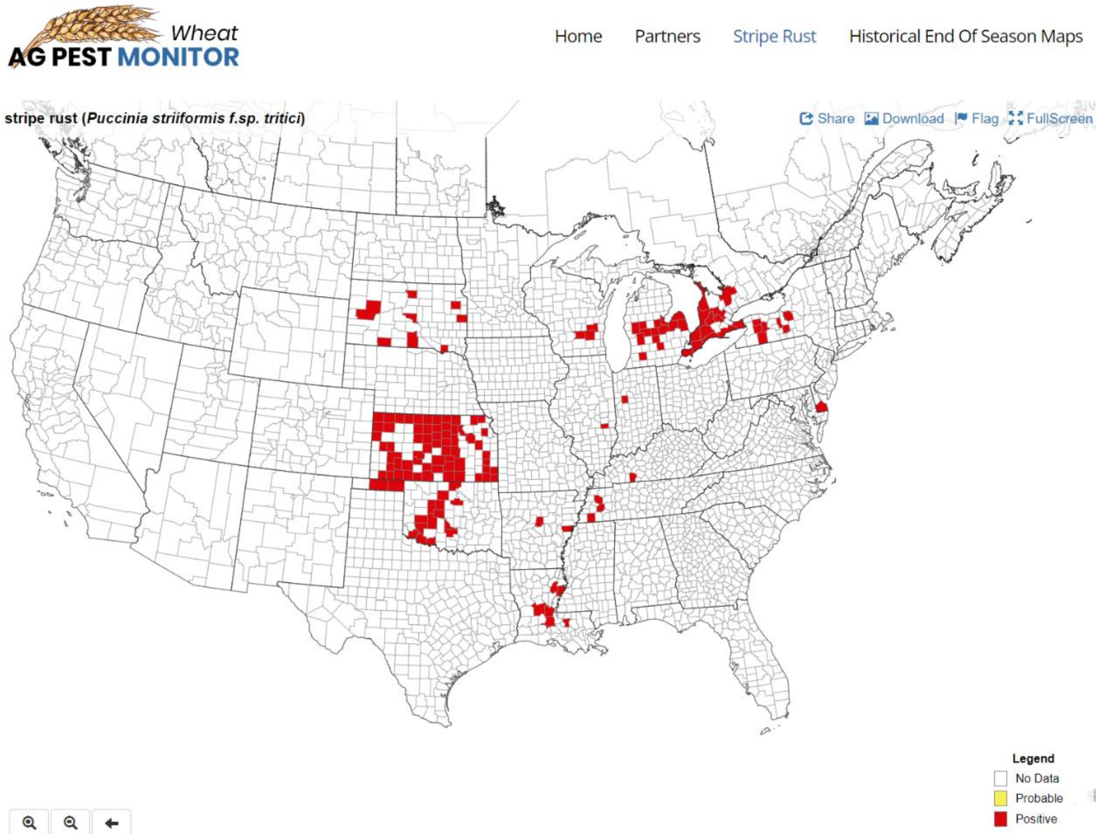

Figure 1. USA stripe rust observations, June 19, 2024 query of the AG PEST MONITOR: Wheat, https://wheat.agpestmonitor.org/stripe-rust/.

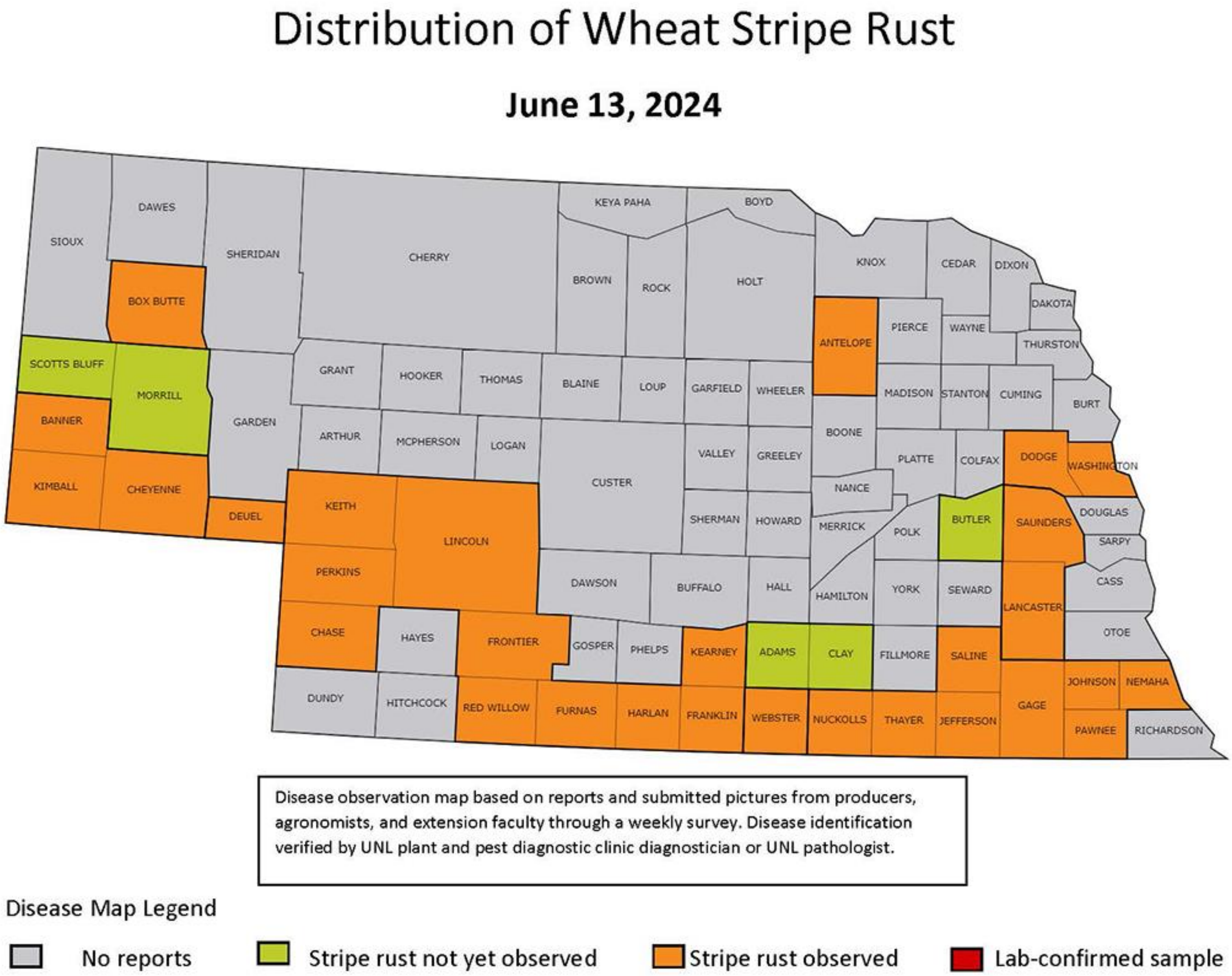

Figure 2. Stripe rust detections in Nebraska counties as of June 13, 2024 (Dr. S. Wegulo et al. June 14, 2024, https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024).

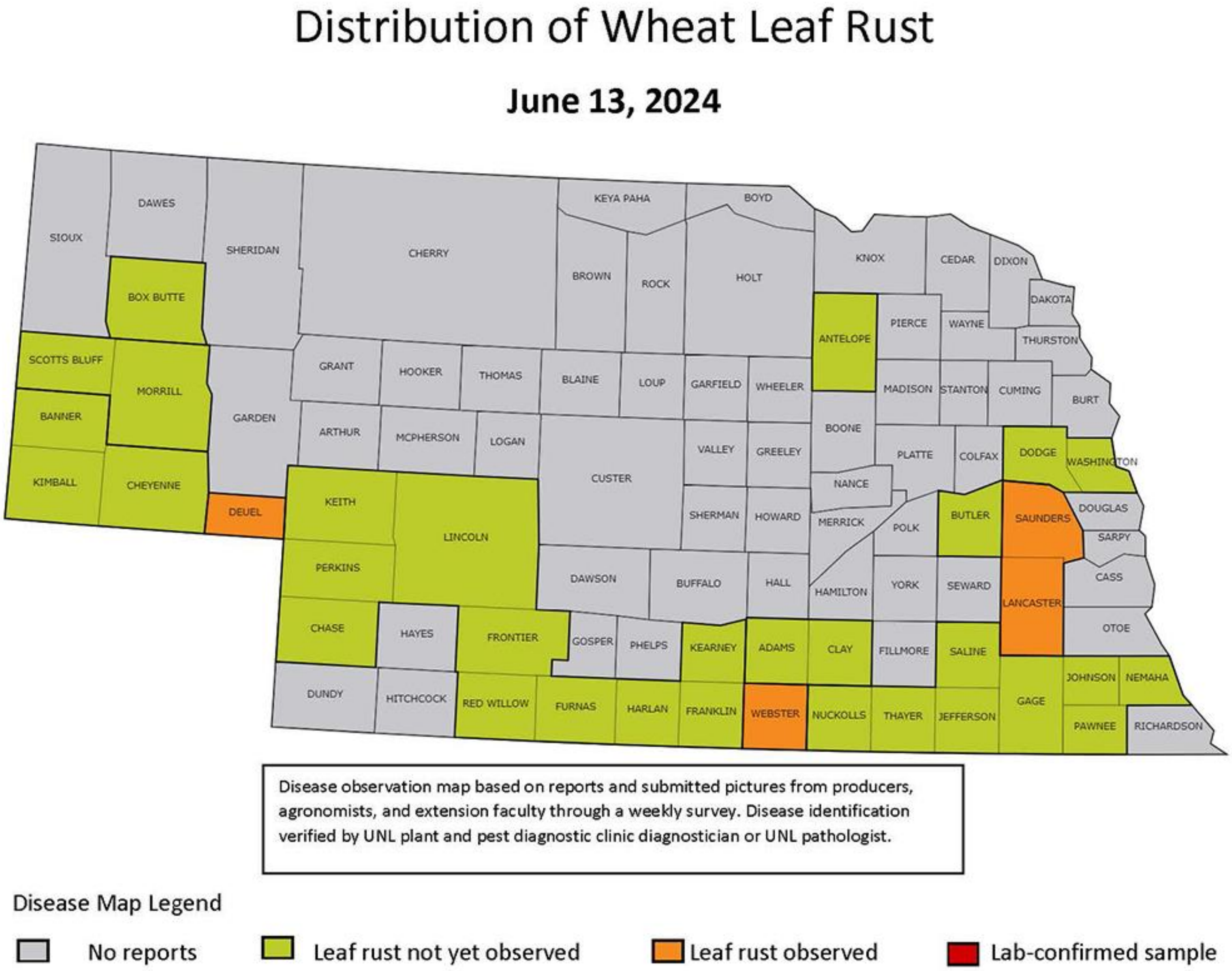

Figure 3. Leaf rust detections in Nebraska counties as of June 13, 2024 (Dr. S. Wegulo et al. June 14, 2024, https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024).

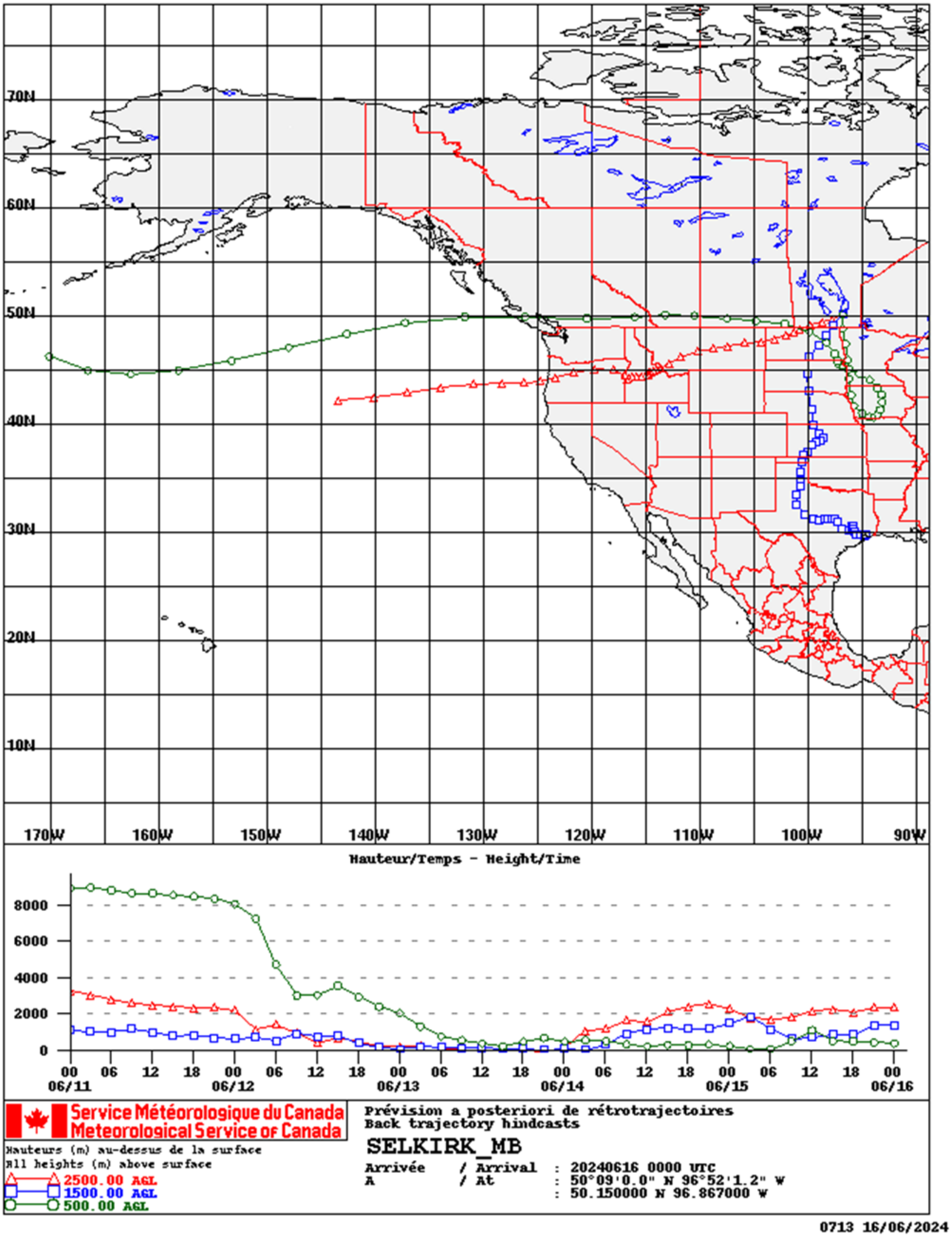

Figure 4. Reverse trajectories for Selkirk, MB for the period of June 11-16, 2024.

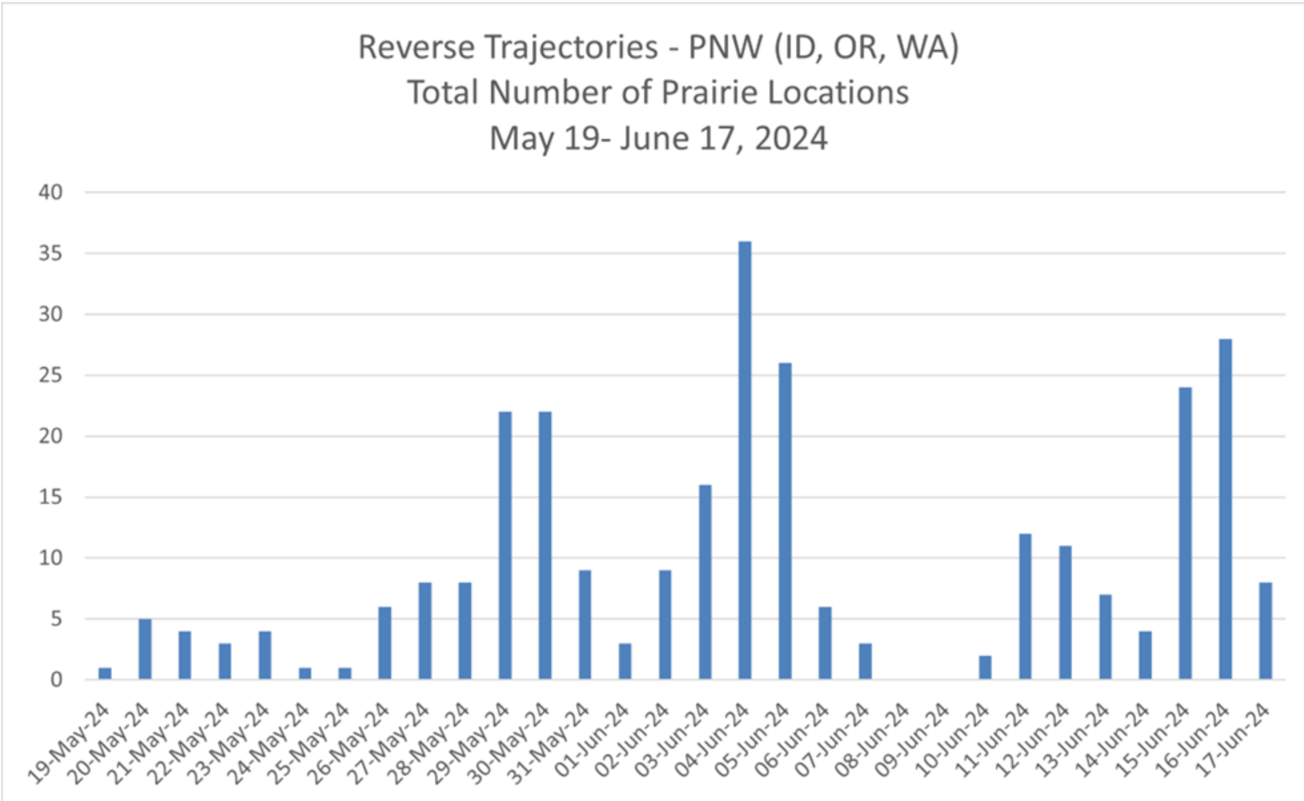

Figure 5. Reverse trajectory locations and daily number of events, for reverse trajectory events originating from the Pacific Northwest region of the USA, May 19 – June 17, 2024.

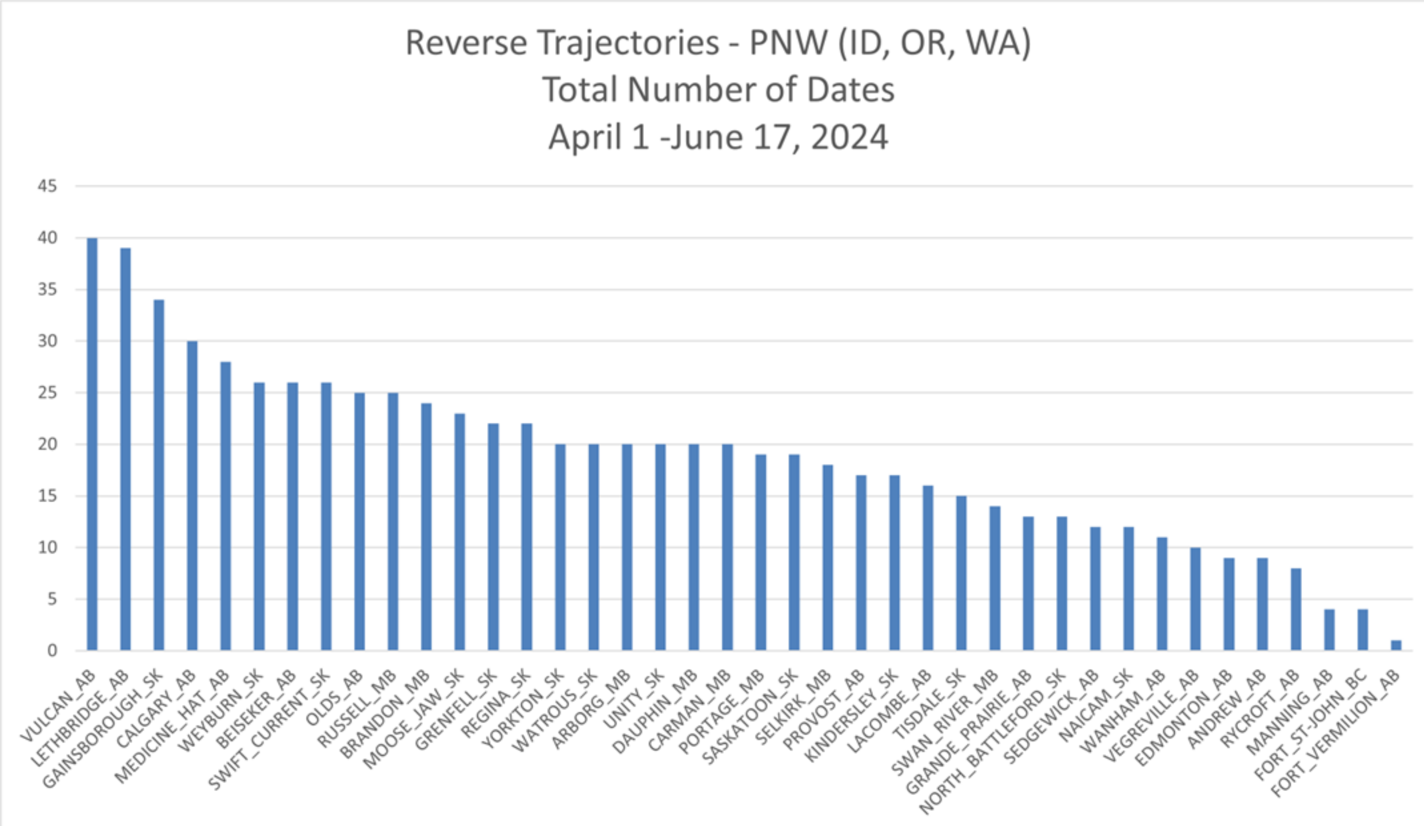

Figure 6. Reverse trajectory locations and number of events, for reverse trajectory events originating from the Pacific Northwest region of the USA, April 1 – June 17, 2024.

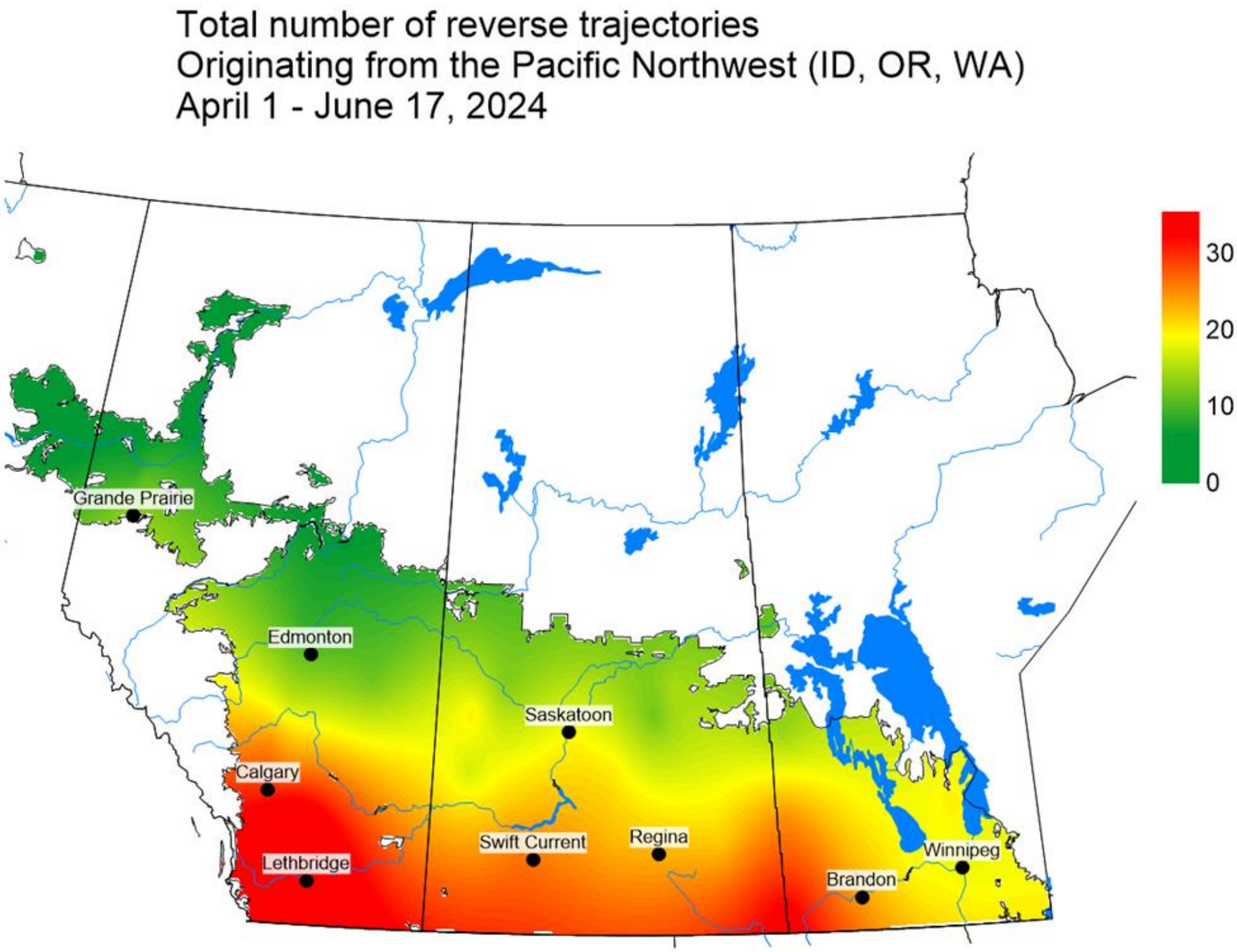

Figure 7. Total number of dates with reverse trajectories originating from the Pacific Northwest region of the USA that have crossed the Prairies between April 1 – June 17, 2024.

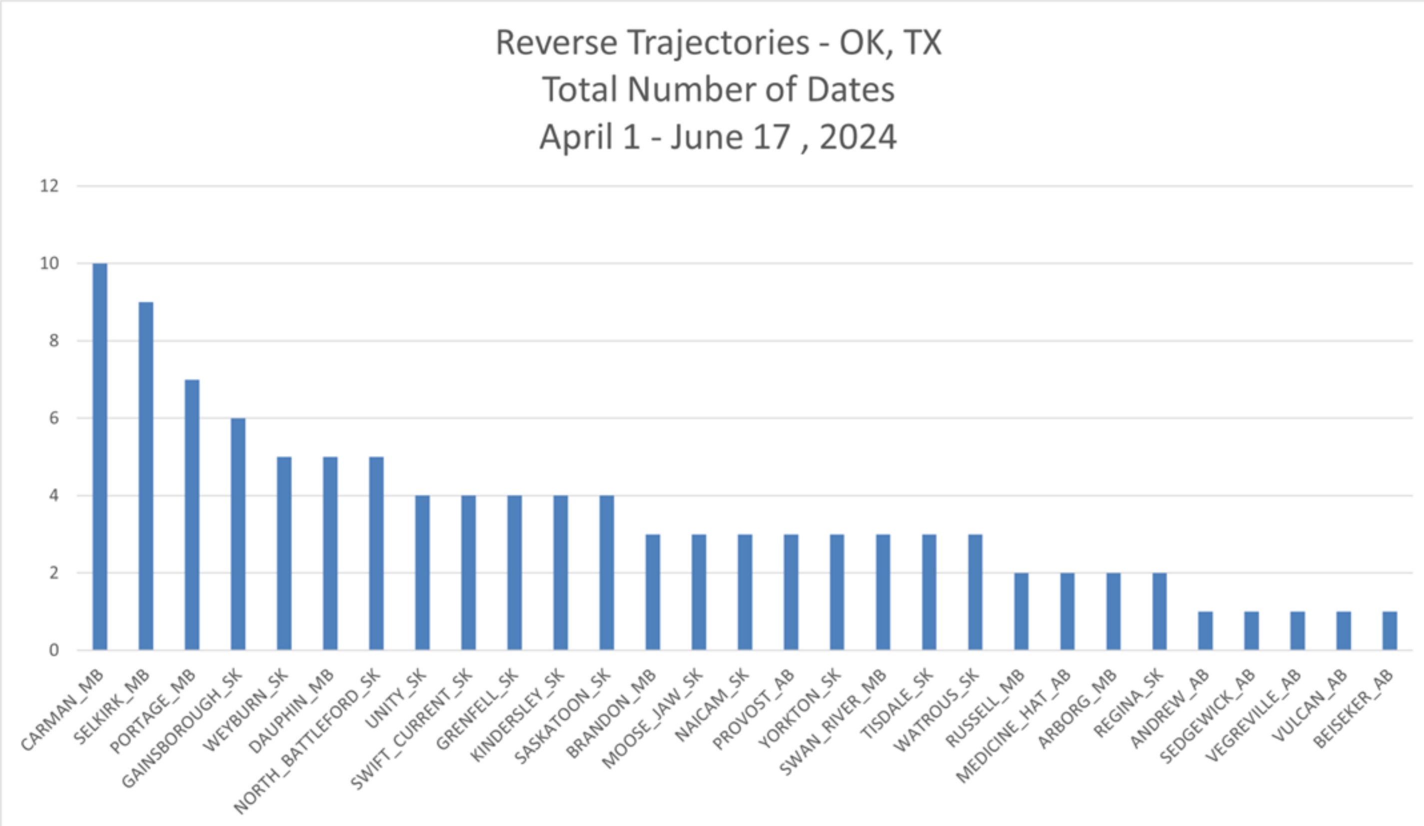

Figure 8. Reverse trajectory locations and number of events, for reverse trajectory events originating from Oklahoma and Texas, USA, April 1 – June 17, 2024.

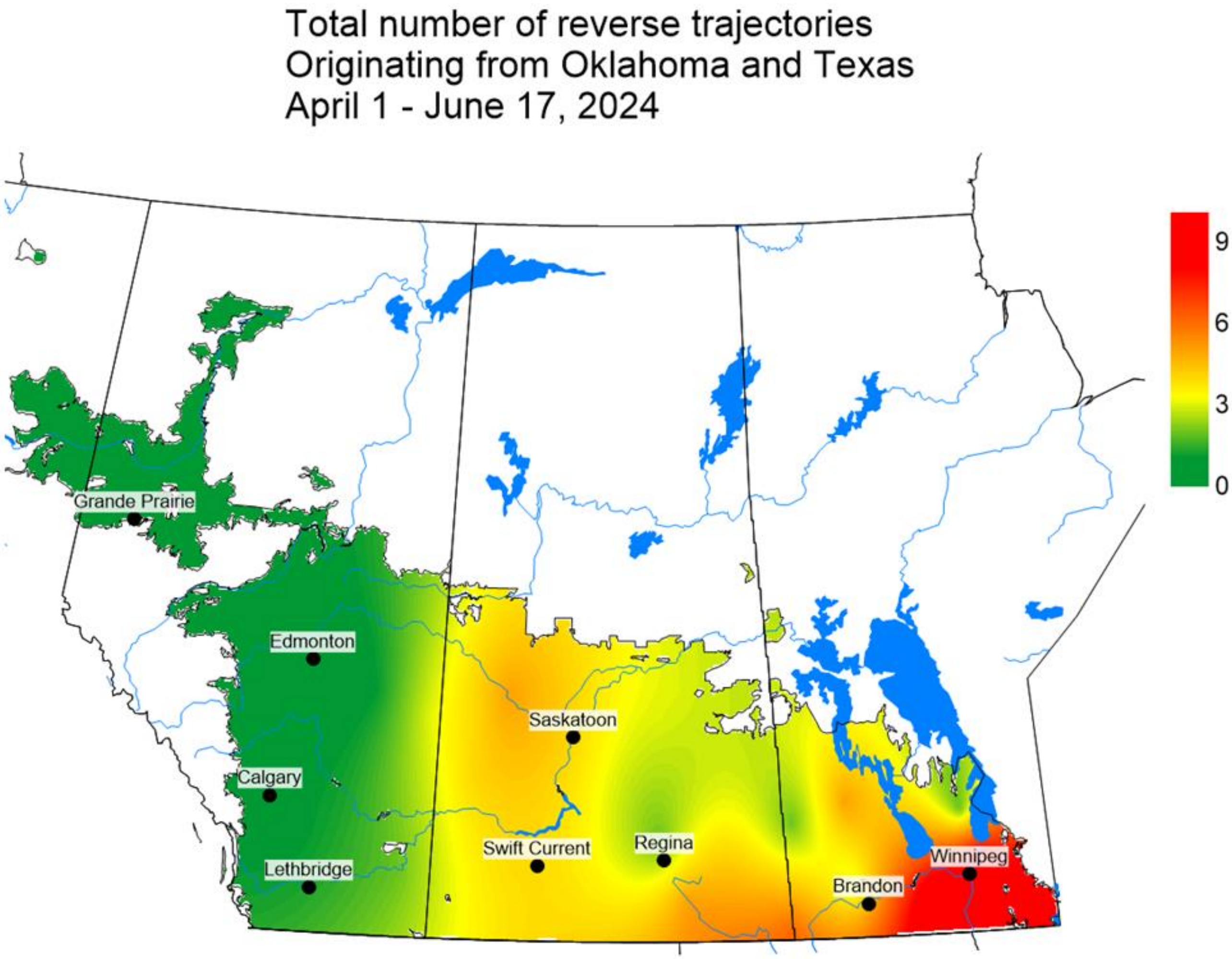

Figure 9. Total number of dates with reverse trajectories originating from Oklahoma and Texas that have crossed the Prairies between April 1 – June 17, 2024.

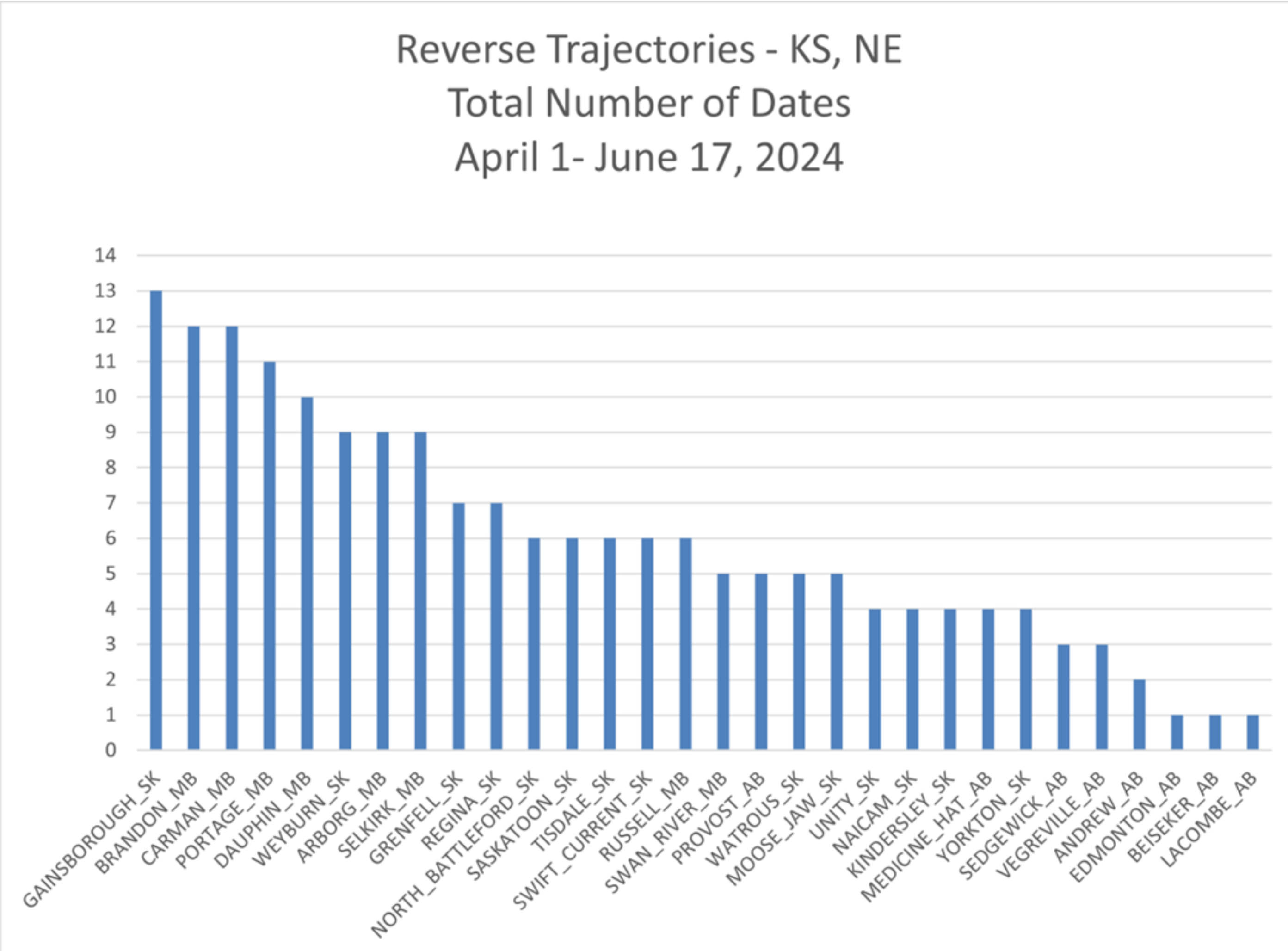

Figure 10. Reverse trajectory locations and number of events, for reverse trajectory events originating from Kansas and Nebraska, USA, April 1 – June 17, 2024.

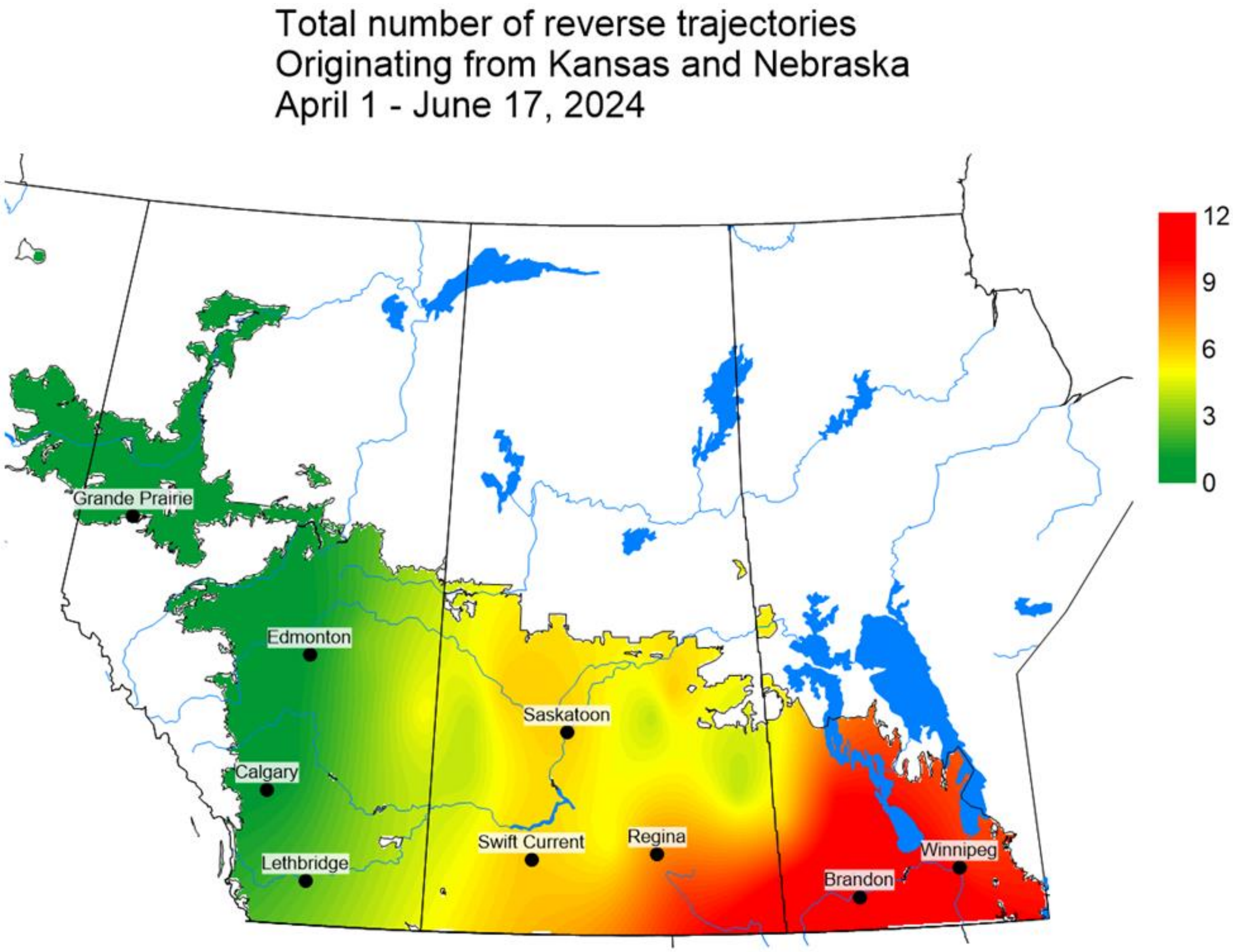

Figure 11. Total number of dates with reverse trajectories originating from Kansas and Nebraska that have crossed the Prairies between April 1 – June 17, 2024.

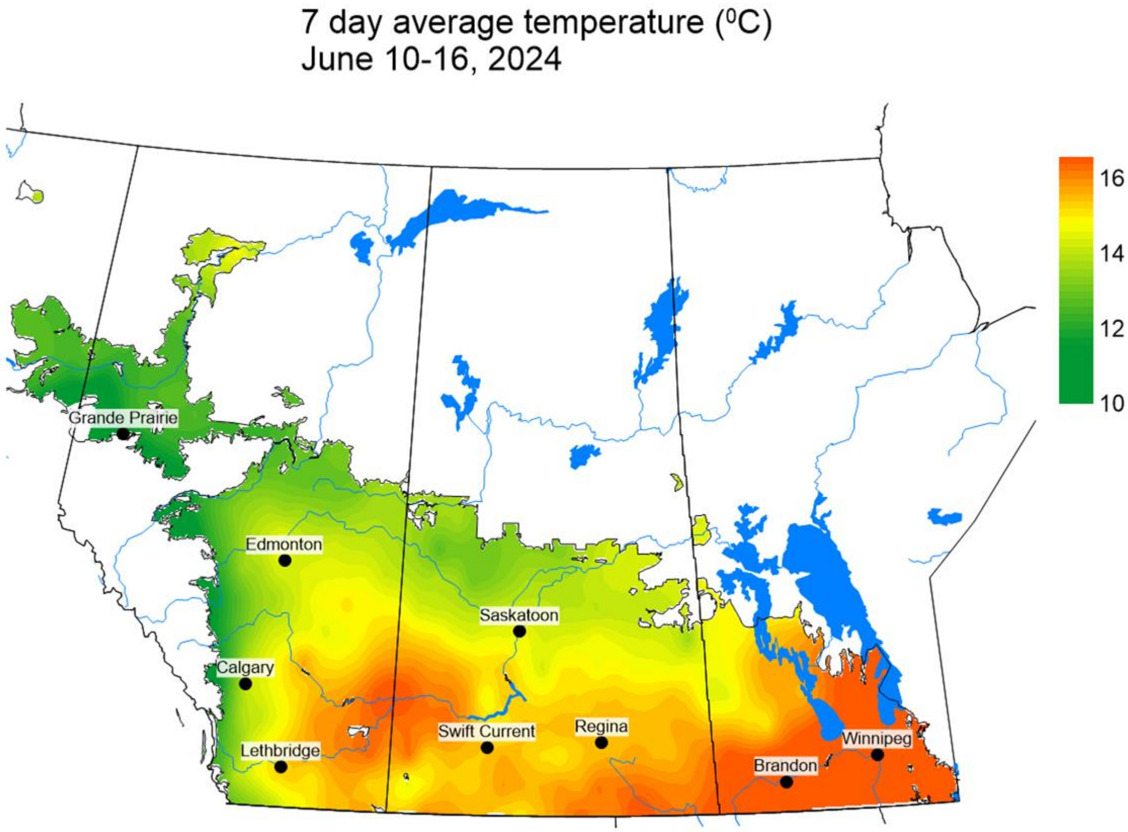

Figure 12. Seven day average temperature (⁰C) observed across the Canadian Prairies for the period of June 10-16, 2024.

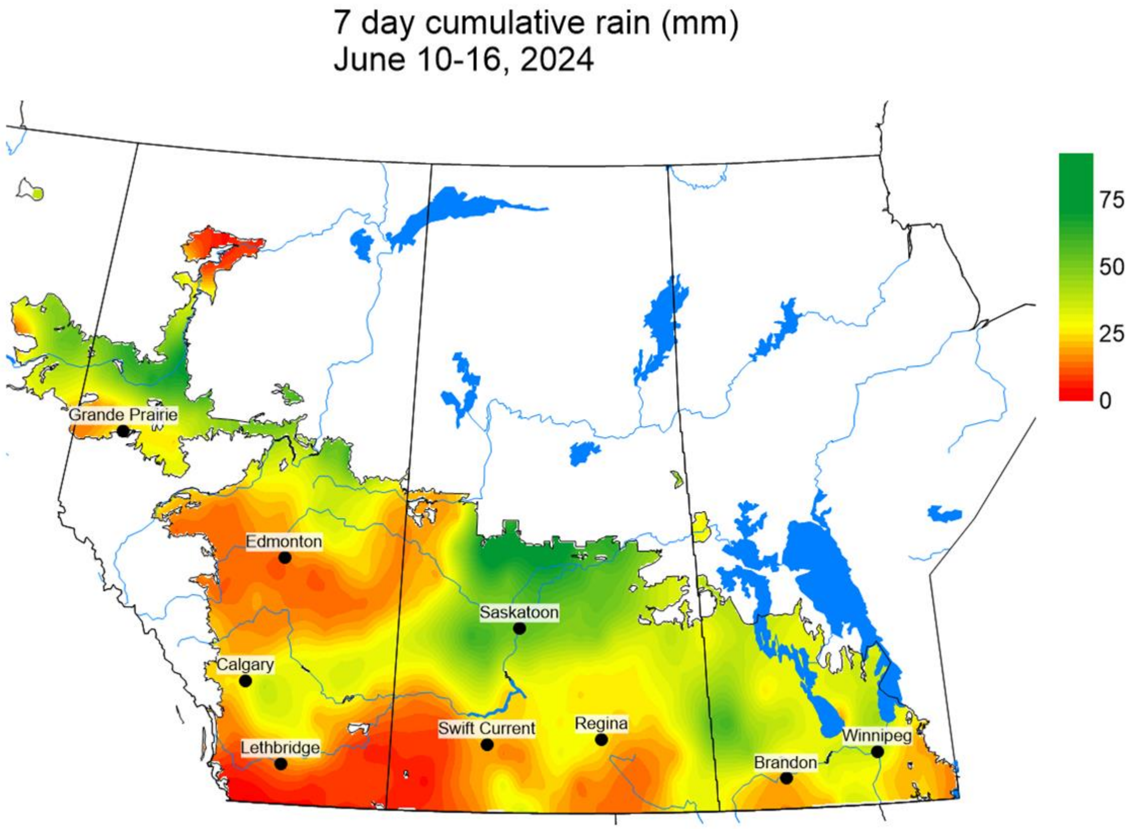

Figure 13. Seven day cumulative rainfall (mm) observed across the Canadian Prairies for the period of June 10-16, 2024.

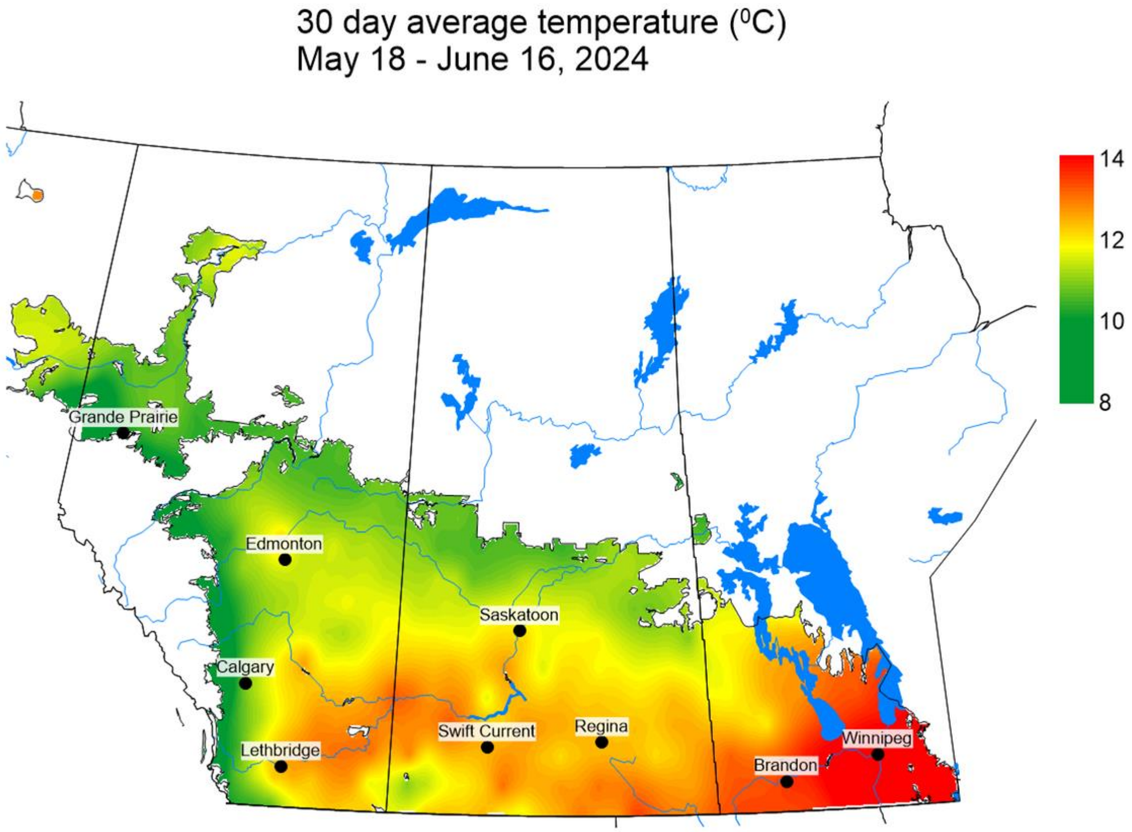

Figure 14. 30-day average temperature (^{0}C) observed across the Canadian Prairies for the period of May 18-June 16, 2024.

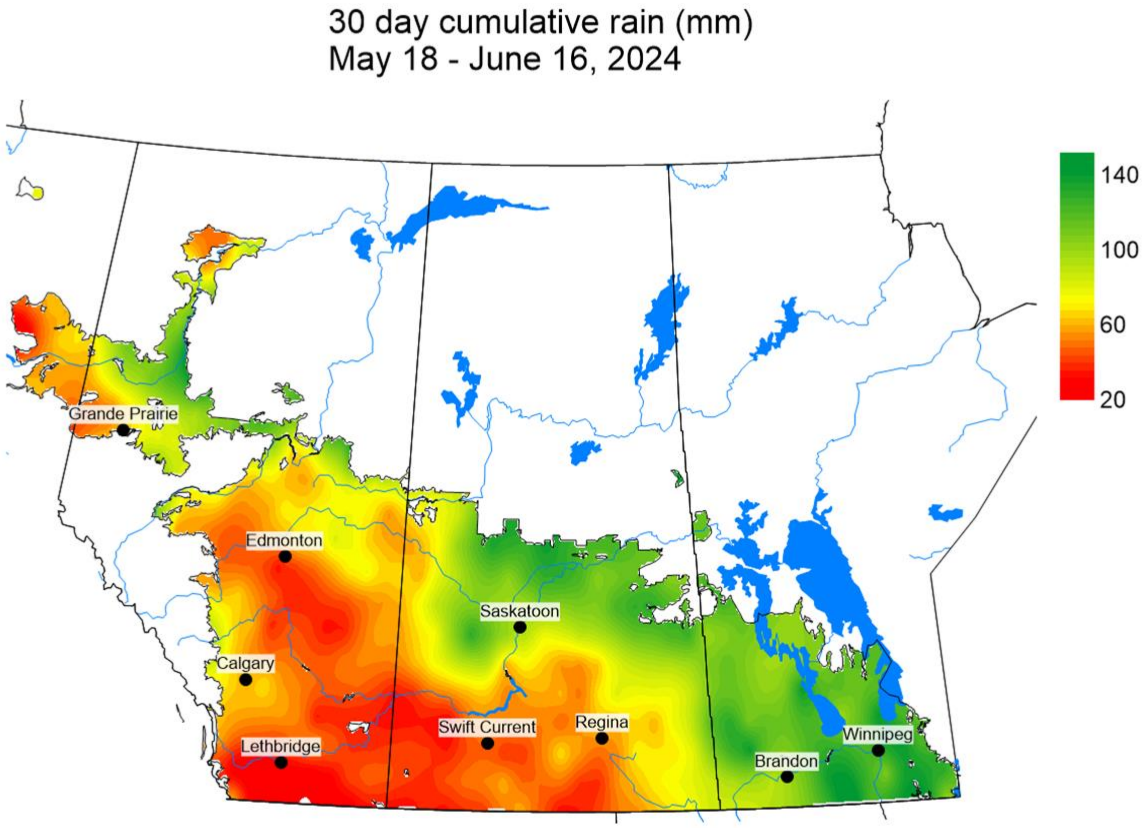

Figure 15. 30-day cumulative rainfall (mm) observed across the Canadian Prairies for the period of May 18 – June 16, 2024.

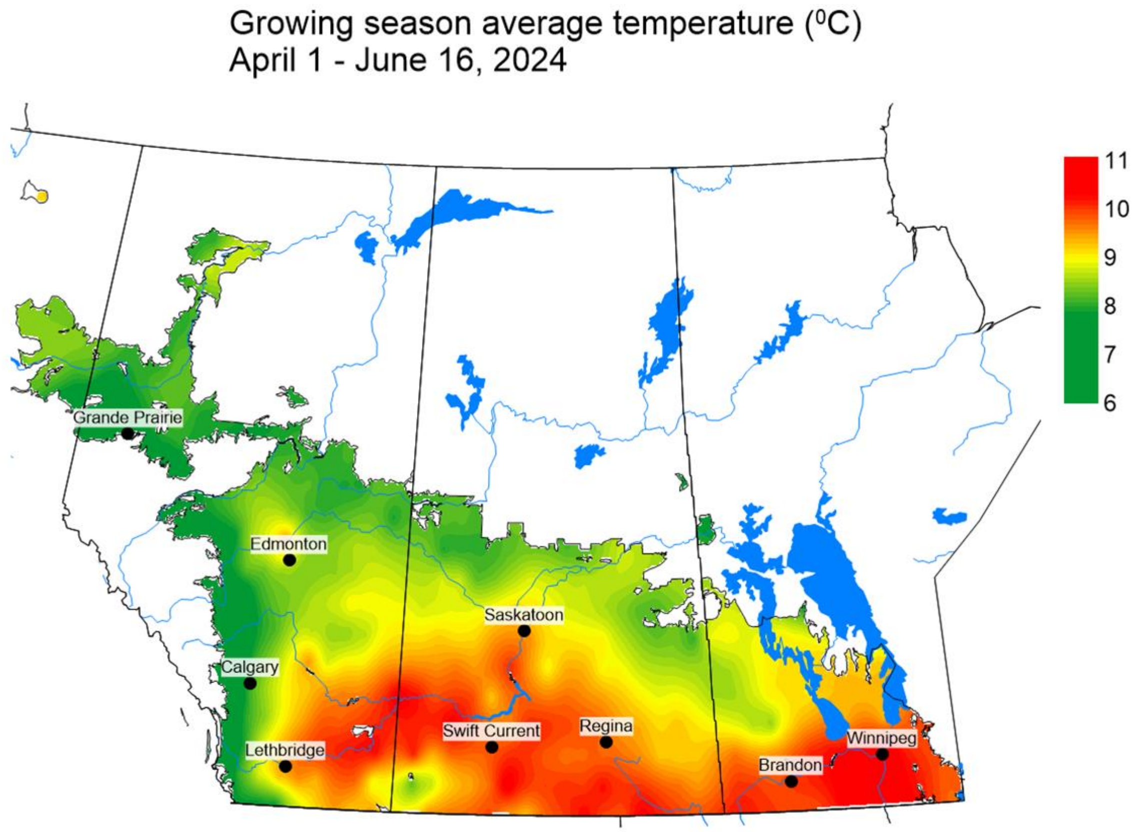

Figure 16. Growing season average temperature (°C) observed across the Canadian Prairies for the period of April 1 – June 16, 2024.

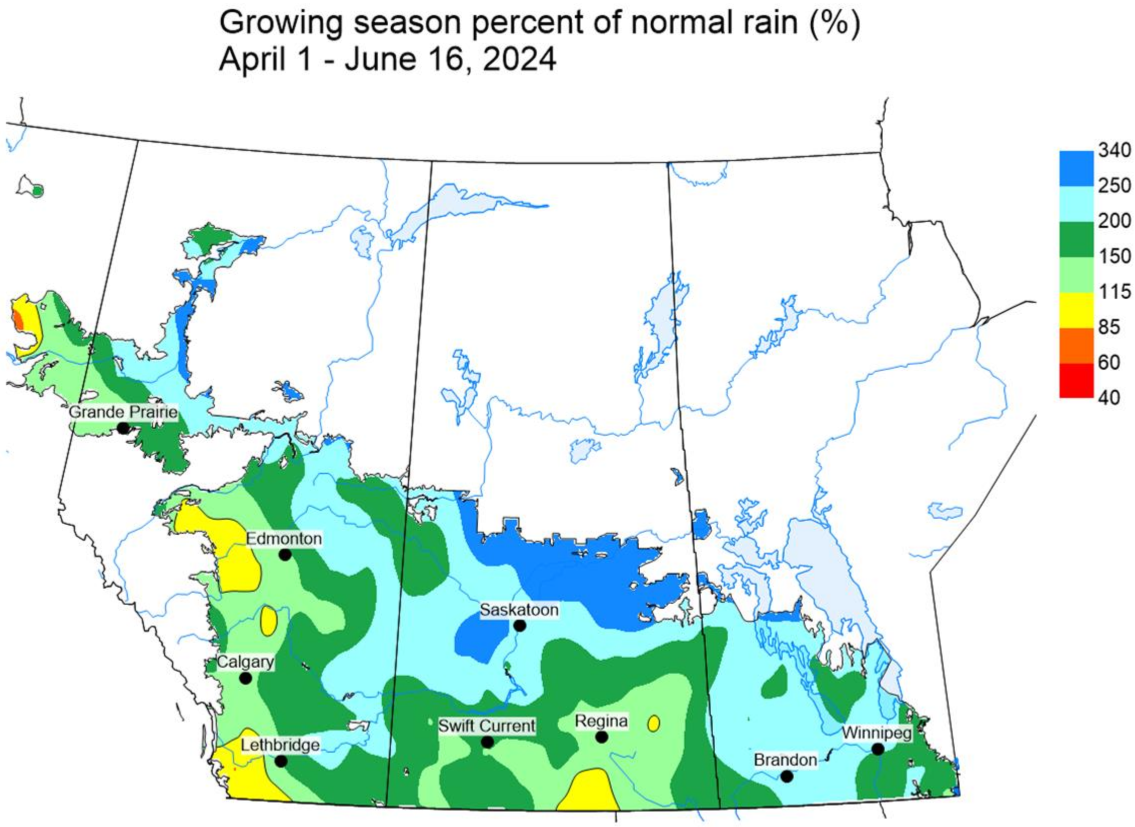

Figure 17. Growing season percent of normal rain (%) observed across the Canadian Prairies for the period of April 1 – June 16, 2024.

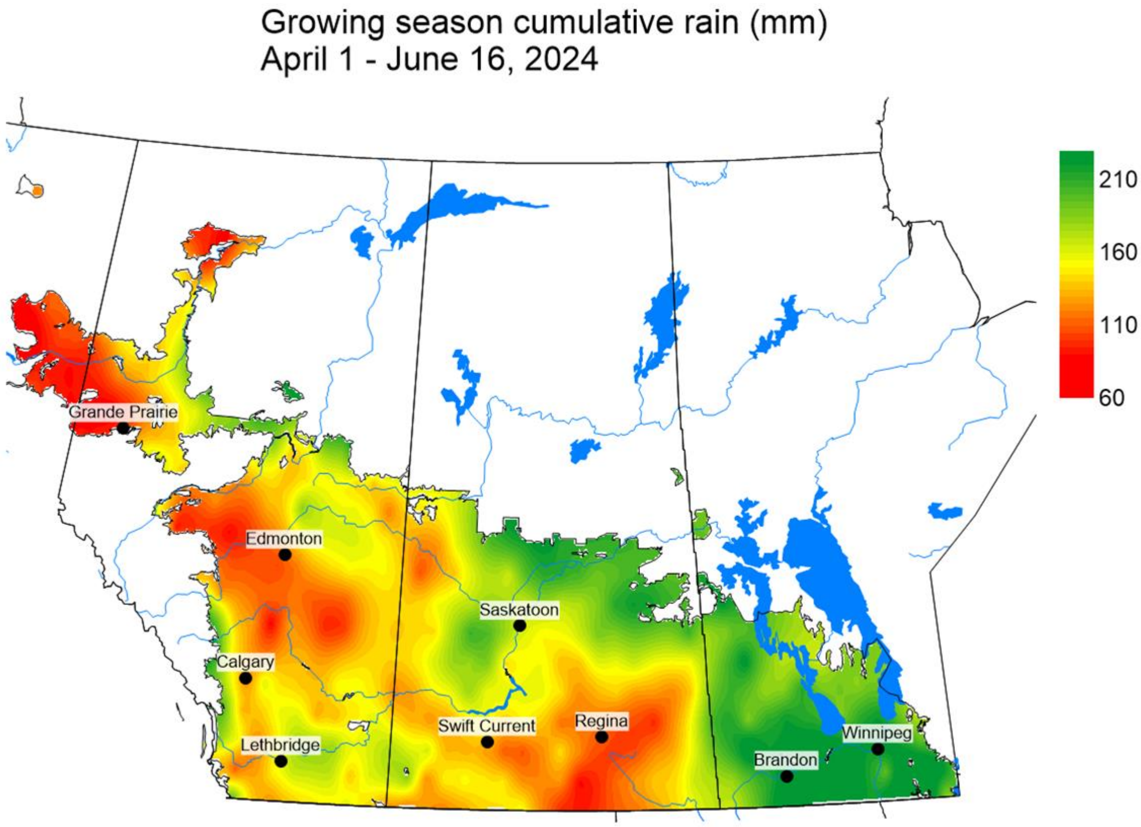

Figure 18. Growing season cumulative rainfall (mm) observed across the Canadian Prairies for the period of April 1 – June 16, 2024.

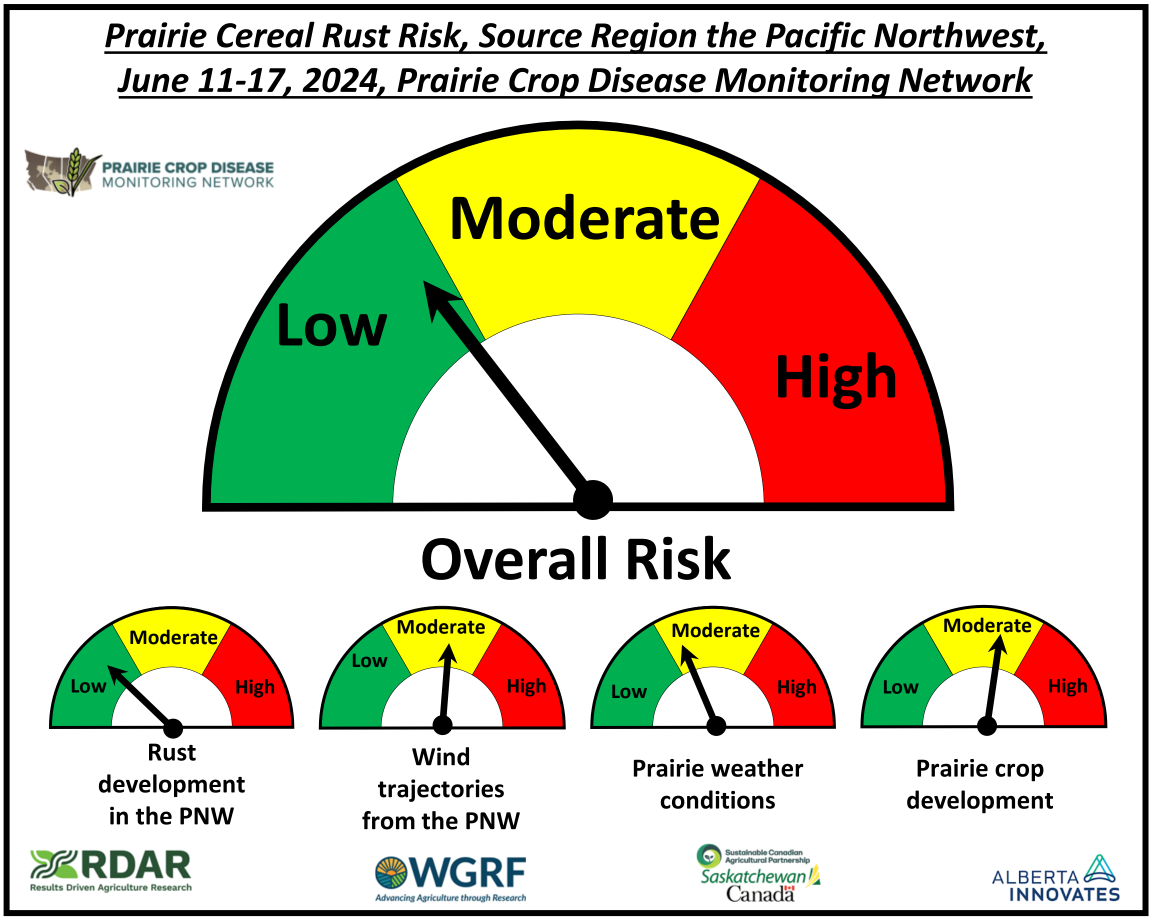

Figure 19. Prairie cereal risk speedometers for stripe rust from the Pacific Northwest, June 11-17, 2024.

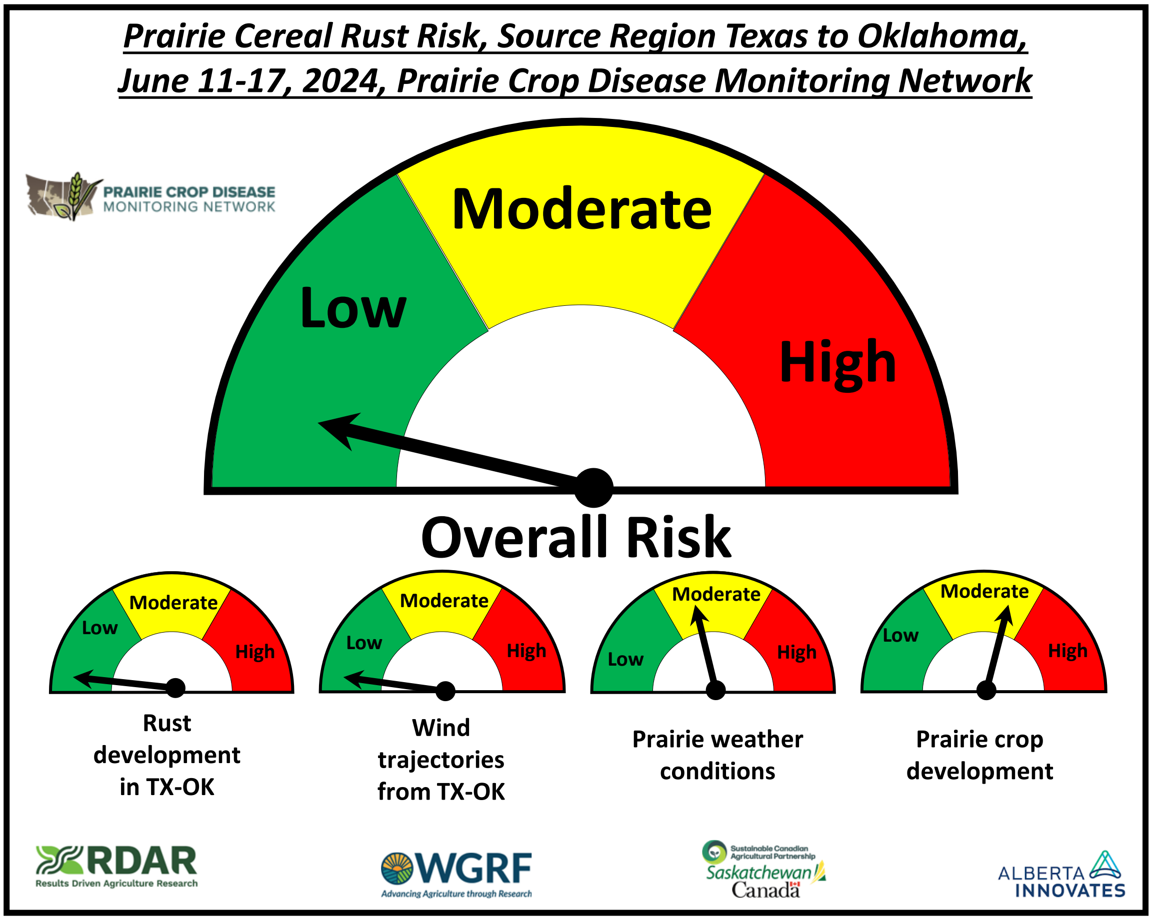

Figure 20. Prairie cereal risk speedometers for stripe/leaf rust from the Texas to Oklahoma region, June 11-17, 2024.

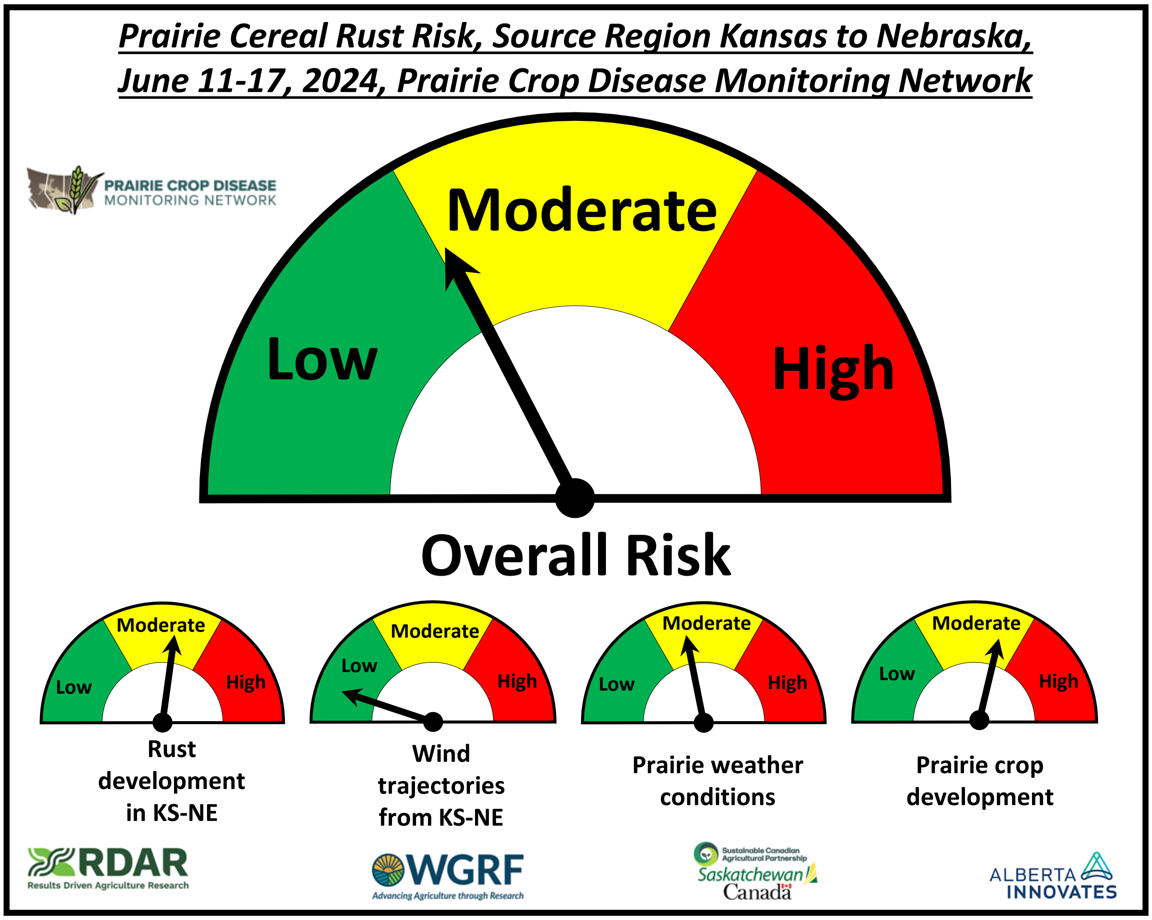

Figure 21. Prairie cereal risk speedometers for stripe/leaf rust from the Kansas/Nebraska region, June 11-17, 2024.

Table 1. Reverse trajectory locations, arrival dates, and number of events, for reverse trajectory events originating from the Pacific Northwest region of the USA, June 11-17, 2024.

Location	Province	11-Jun-24	12-Jun-24	13-Jun-24	14-Jun-24	15-Jun-24	16-Jun-24	17-Jun-24	Total trajectories/ location
LETHBRIDGE	AB	1	1		1	1	1		5
VULCAN	AB	1	1		1	1	1		5
BEISEKER	AB		1		1	1	1		4
CALGARY	AB		1		1	1	1		4
BRANDON	MB			1		1	1	1	4
CARMAN	MB	1		1			1	1	4
GAINSBOROUGH	SK			1		1	1	1	4
MOOSE JAW	SK	1		1		1	1		4
LACOMBE	AB		1			1	1		3
MEDICINE HAT	AB		1			1	1		3
OLDS	AB		1			1	1		3
PROVOST	AB		1			1	1		3
DAUPHIN	MB	1					1	1	3
PORTAGE	MB			1			1	1	3
RUSSELL	MB	1		1			1		3
SELKIRK	MB	1		1				1	3
SWIFT CURRENT	SK		1			1	1		3
TISDALE	SK					1	1	1	3
UNITY	SK	1				1	1		3
WEYBURN	SK	1				1	1		3
YORKTON	SK	1				1	1		3
EDMONTON	AB		1			1			2
SEDGEWICK	AB		1			1			2
VEGREVILLE	AB					1	1		2
ARBORG	MB						1	1	2
KINDERSLEY	SK	1				1			2
REGINA	SK	1					1		2
SASKATOON	SK					1	1		2
ANDREW	AB					1			1
WANHAM	AB					1			1
SWAN RIVER	MB						1		1
GRENFELL	SK						1		1
NAICAM	SK						1		1
NORTH BATTLEFORD	SK						1		1
WATROUS	SK					1			1
Total trajectories per date		**12**	**11**	**7**	**4**	**24**	**28**	**8**	**94**

Table 2. Reverse trajectory locations and number of events, for reverse trajectory events originating from Oklahoma and Texas, USA, June 11-17, 2024.

Location	Province	11-Jun-24	12-Jun-24	13-Jun-24	14-Jun-24	15-Jun-24	16-Jun-24	17-Jun-24	Total trajectories/location
CARMAN	MB						1		1
PORTAGE	MB						1		1
SELKIRK	MB						1		1
WEYBURN	SK					1			1
Total trajectories per date		0	0	0	0	1	3		4

Table 3. Reverse trajectory locations, arrival dates, and number of events, for reverse trajectory events originating from Kansas and Nebraska, USA, June 11-17, 2024.

Location	Province	11-Jun-24	12-Jun-24	13-Jun-24	14-Jun-24	15-Jun-24	16-Jun-24	17-Jun-24	Total trajectories/location
ARBORG	MB	1					1		2
BRANDON	MB	1					1		2
CARMAN	MB						1		1
DAUPHIN	MB	1							1
GAINSBOROUGH	SK						1		1
PORTAGE	MB	1					1		2
REGINA	SK	1				1			2
SELKIRK	MB						1		1
WEYBURN	SK	1				1			2
Total trajectories per date		6	0	0	0	2	6		14